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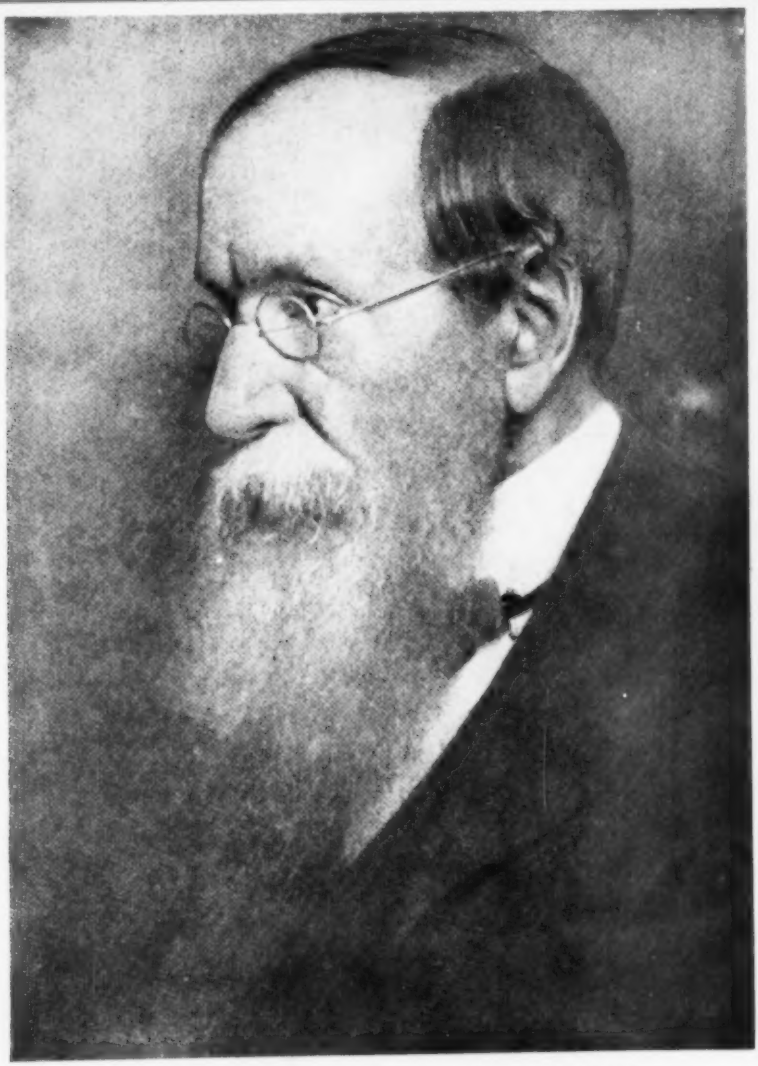

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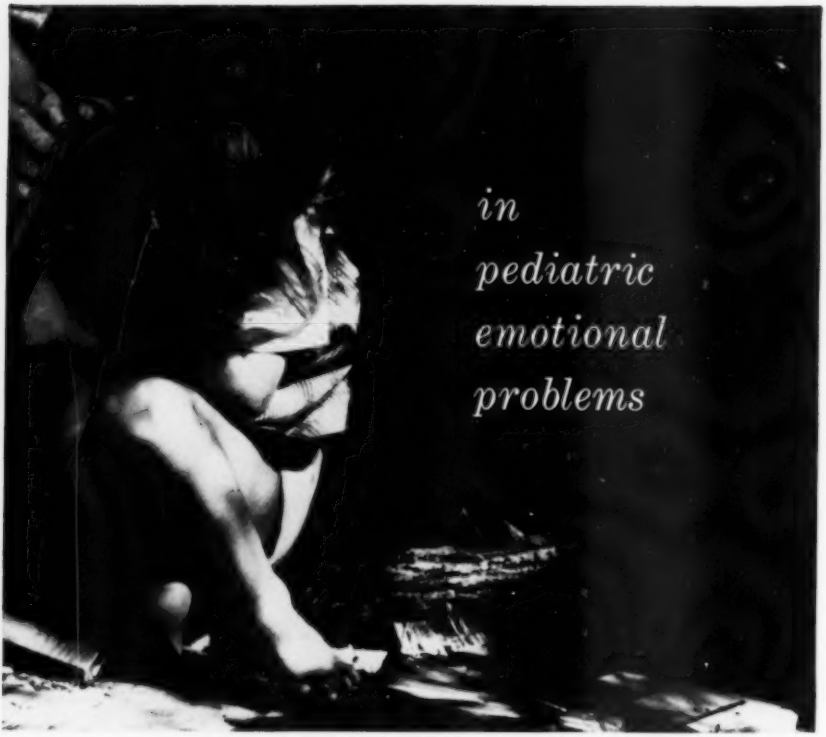

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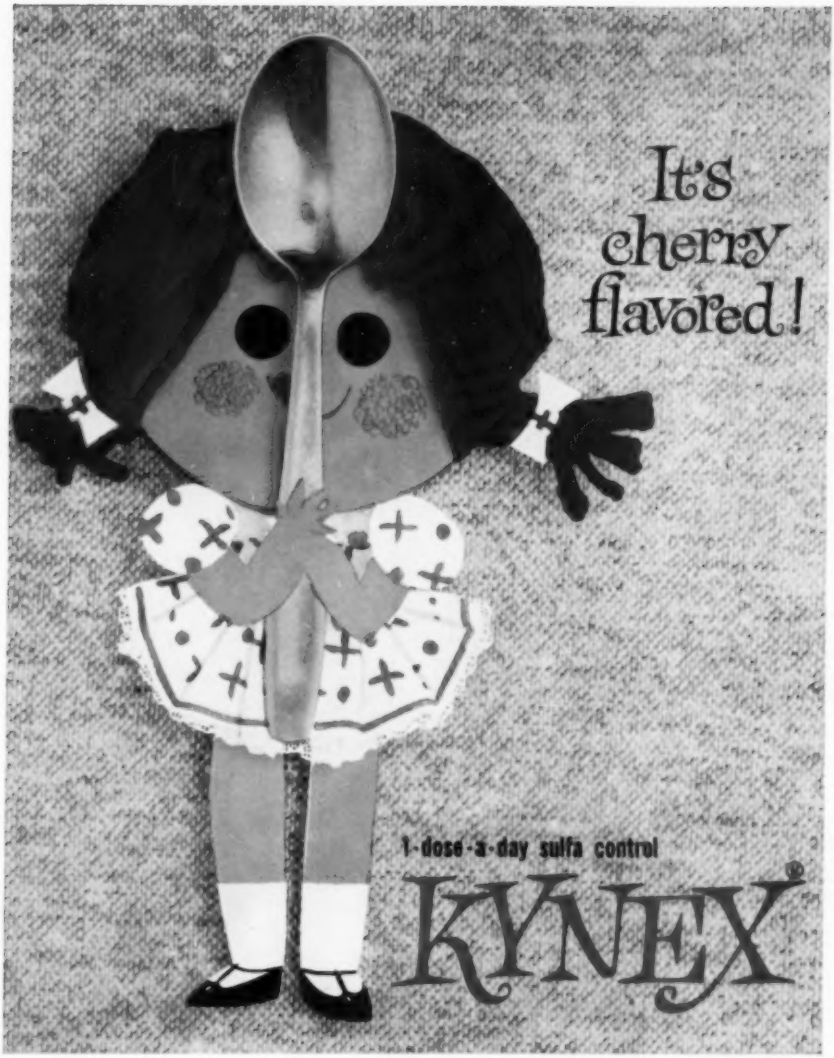

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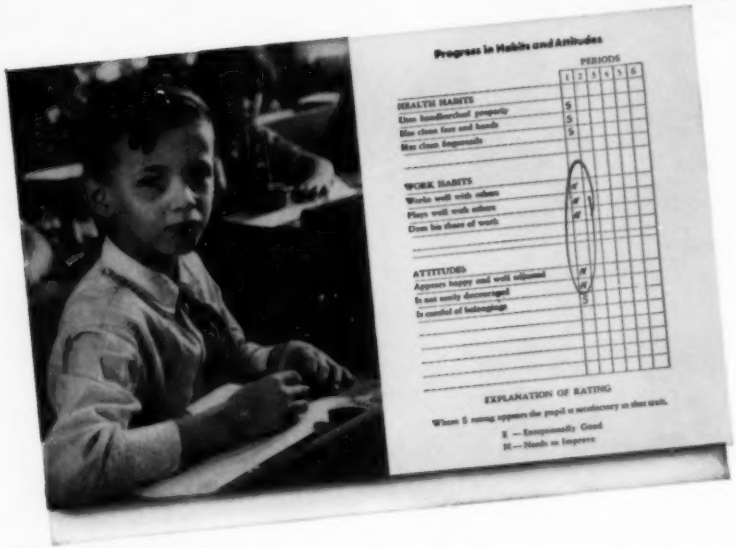

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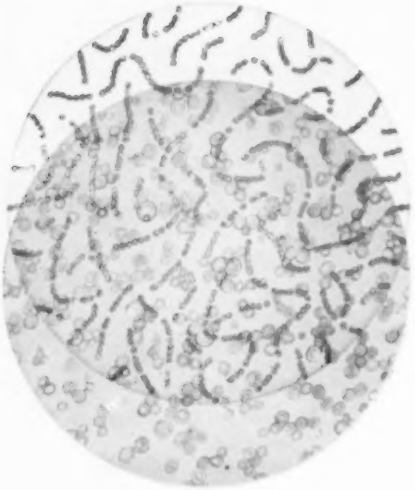

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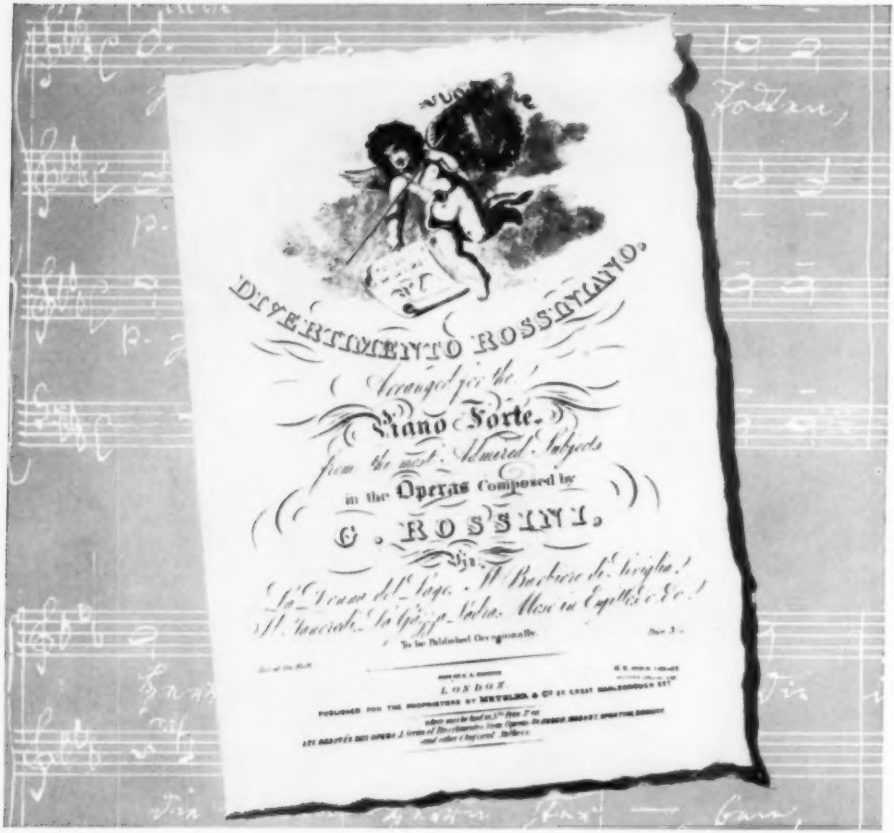

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July 1959
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TUBERCULOSIS IN CHILDHOOD

Part III

REGRESSIVE PULMONARY INFILTRATES OF TUBERCULOUS ORIGIN ("EPITUBERCULOSIS")

Ph. SCHWARTZ, M.D.*

Pennsylvania

I. INTRODUCTORY REMARKS

The assumption that tuberculous changes may regress and heal has always been the premise of every therapeutic endeavor. In spite of this fact, sharp controversy was aroused when, almost 35 years ago, Redeker and Simon maintained that extensive pulmonary infiltrations of tubercular origin may disappear without causing significant parenchymal destruction. Similar skepticism greeted the pathogenetic interpretation of reversible pulmonary condensations as a peculiar ("allergic") reaction, which appears in the course of a tuberculous infection as a consequence of hypersensitivity (i.e., a rise in the inflammatory disposition) and of the postinfectiously increased resistance to tubercle bacilli. The concept of Eliasberg and Neuland, who considered regressive inflammatory infiltrates in tuberculous children to be "epi" tuberculous—that is, nonspecific—was better adapted to the traditional doctrines and, therefore, accepted without contradiction. Then came Wallgren's and Prosoroff's publications (1926 and 1929) which stressed that loss of air in pulmonary tissue, induced by lymphonodogenic bronchial compression, is of importance in the pathogenesis of reversible "epi" tuberculous condensations. In elaborating these ideas, Rössle (1935) declared that not only epituberculous, but also all other regressive condensations observed in children and in adults—for example, early infiltrations—constitute nothing but the simple results of a mechanical bronchial compression, caused by swollen

* Chief, Dept. of Pathology, Warren State Hospital, Warren, Pa.; Prof. of Gen. Path. and Path. Anat., Univ. Frankfurt-M., Germany; Former Director, Dept. Path. at the Univ. Istanbul, Turkey.

lymph nodes; the condensation disappears when the volume of the lymph nodes decreases, thus allowing the affected pulmonary parts to resume normal respiration.† These opinions—with minor divergencies—were shared by Dufourt (1946), Görgényi-Göttche (1949, 1951), Rogstad (1951), and by Wissler (1958), who spoke of "obstructive infiltrations."

No doubt, the questions posed in connection with reversible pulmonary condensations are intimately linked to the problems of hilar tuberculosis. Actually, reversible condensations—to be regarded as specific or nonspecific inflammatory reactions, or simple atelectasis—are generally considered to be the consequences of tubercular involvements of hilar lymph nodes. Our own investigations (1948, 1949, 1953) disclosed that tuberculous lymph nodes of the hilar area, in many cases, provoke the appearance of reversible pulmonary infiltrations by discharging their infectious and toxic, necrotic masses into the tracheobronchial system. Rietschel (1952), Erichson (1953), and Brügger (1955) also emphasized the decisive pathogenic importance of bronchial lesions produced by discharging tubercular lymph nodes and the tubercular inflammatory nature of "epitubercular" regressive pulmonary infiltrations.‡

Reversibility of tuberculous infiltrations is a clinical concept related to cases in which more or less extensive, radiologically-detected pulmonary condensations have disappeared without trace, in the course of some months, or perhaps after many years. Therefore, if we intend to deal with this problem from a pathologic-anatomical point of view, it would seem reasonable to keep in mind that a healing process, which clinically appears to be ideal, does not always correspond to a perfect anatomical restitution. Even a common pneumonic infiltration, which is a lesion characterized by an acute course—and in many cases certainly is "regressive"—leaves some sequelae, at least, pleural adhesions. Thus, we should not exaggerate our expectations, and in the case of a chronic disease such as pulmonary tuberculosis, we cannot expect more than in regressing acute and subacute kidney, heart and cerebral conditions. Our attitude will correspond to the generally-accepted principles of pathology only if we consider as "reversible" both pulmonary infiltrations which regress without noticeable parenchymal destruction and processes which heal, leaving scars or defects.

† Rössle believed that his anatomical observations proved the superfluity of concepts such as "hypersensitivity," "allergic reactivity," "immunity" in the pathogenesis of pulmonary tuberculosis.

‡ R. W. Müller, in 1942, stressed the necessity of differentiating between inflammatory pulmonary infiltrations of tuberculous origin and pulmonary collapse in cases which clinically give the impression of an epituberculosis.

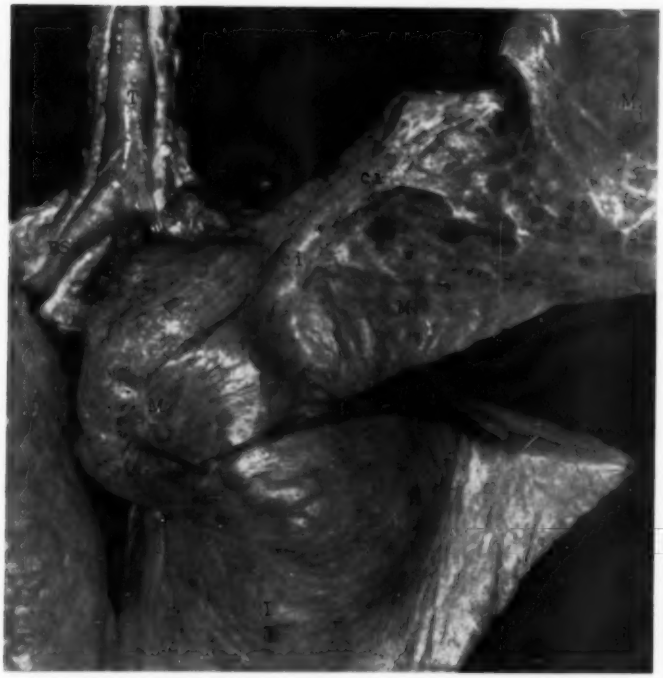

Fig. 1. Absence of Right Upper Lobe, Following Lymphonodogenic Lesion. (A 6-year-old boy; A. 10/48, Istanbul; Case No. 1, Group I).
S—Cicatricial remnant of the right upper lobe.
ci—Cicatricial devastation of the right middle lobe.

In the course of years, even very large pulmonary defects may be repaired to such a degree that only a particularly careful anatomical examination will reveal their sequelae. We observed the case (Fig. 1) of a six-year-old boy (A.10/42 Path. Inst., Univ. Istanbul, Turkey) who, following a typical lymphonodo-bronchogenic superinfection, almost completely lost his right upper lobe (Group I, Case 1); nevertheless, the clinical radiological examination missed the defect. In this case, had the extensive infiltration of the right upper lobe been radiologically detected in the period directly after the discharge of the tuberculous lymph nodes into the bronchial system, that is, 2 to 3 years before death, what an impressive instance of a "reabsorption" of an epituberculous condensation could have been observed! In another case, concerning a male

Fig. 2. Extreme Cicatricial Shrinking of the Right Middle Lobe, Following Extensive Lymphonodogenic Bronchial Lesion. (A 43-year-old male; A. 512/48, Istanbul; Case 3, Group I).
Arrows.... indicate the perforative scar of the anterior wall of the stem bronchus.
mB—Obliterated bronchus of the right middle lobe.
M—Remnant of the cicatricially shrunken middle lobe.

of 43 (A.512/48, Path. Inst., Univ. Istanbul, Case 3 of Group I), we observed, coincidentally with a large perforative scar of the main bronchus of the middle lobe, the shrinking of the right middle lobe to a small lump (Fig. 2), which we assume could not be shown clinically; after further time—20 to 30 years—it may be transformed into a minute stump.

Similarly, no clinical pulmonary changes were observed shortly before death in a 26-year-old male (A. 7/52 Wrentham, Case 2 of Group I), who died of a severe renal disease induced by a healed lymphonodo-bronchogenic pulmonary tuberculosis destroying the right upper lobe (Fig. 3). In the initial stage of the process,

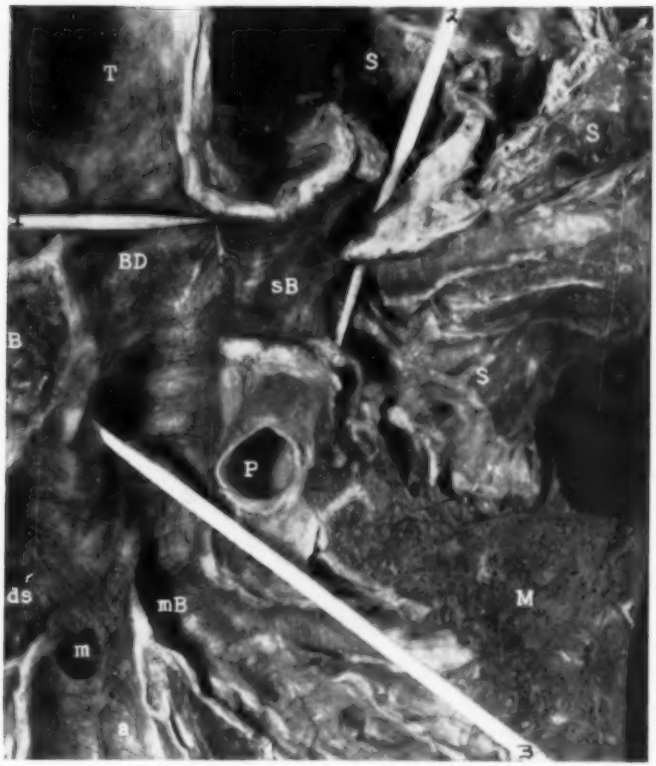

Fig. 3. Cicatricial Devastation and Shrinking of the Right Upper Lobe, following Large Lymphonodogenic Bronchial Lesions. (A 27-year-old male; A. 7/52, Wrentham; Case No. 2, Group I).
Probe No. 1 indicates large perforative scar caused by the discharge of tuberculous paratracheal lymph nodes, located below the right subclavian artery.
Probe No. 2 indicates large bridge-like perforative scar, caused by the discharge of large tuberculous lymph nodes of the anterior hilar angle.
Probe No. 3 leads into a large diverticular perforative scar, caused by the discharge of bifurcation lymph nodes.
S—Cavitated and cicatricially devastated right upper lobe.

more than 20 years before death, radiographic evidence of an epituberculous condensation was present.

Observations of this kind proved the usefulness of adopting the clinical point of view in considering whether or not a certain case of pulmonary condensation belonged to the reversible group. Thus, our task here can only be to describe all pathologic-anatomical

changes which characterize reversible inflammatory infiltrations in pulmonary tuberculosis and to define the conditions which determine their development.

Fig. 4. Extremely Voluminous Aspiration-Infiltration of the Left Lower Lobe in a Sensitized Rabbit which Received the Intratracheal Injection of an Extract of Killed Tubercle Bacilli. (Rabbit No. 2642).

Preinfection of the left testicle with bacilli of a bovine strain. 21 days later, large doses of an extract of killed bacilli were injected intratracheally. The animal was sacrificed 8 days after the intratracheal injection. Autopsy disclosed numerous hematogenic metastases of the testicular focus in both lungs. The left lower lobe exhibited a very large and massive aspiration-infiltration, which was partially necrotic. (We showed the microscopic aspect of this infiltrate in our first paper of this series, Fig. 10 in Arch. Ped., Vol. 75, page 329). The aspiration infiltrate contained tubercle bacilli in excessive numbers.

Epicrisis: The testicular infection caused the sensitization of the organism. Therefore, the intratracheal introduction of an active extract of dead tubercle bacilli was capable of producing a very extensive aspiration-infiltration. The extraordinary accumulation of tubercle bacilli within the aspiration-infiltration could only originate from germs located in the primary testicular focus and in its metastases.

II. REMARKS ON NORMERGIC AND ALLERGIC INFLAMMATION, PARTICULARLY IN TUBERCULOSIS

Tuberculosis is an inflammation, that is, a process characterized by circulatory disturbances, vasogenic exudation and cellular diapedesis, and accompanied by cellular proliferation, necrosis and disintegration. Systematic investigations disclosed that the inflammatory tissular reaction, in general, is bound to terminal vascular branchings, decisively influenced by their vasomotor innervation (Ph. Schwartz: Entzündung, Entzündungsbereitschaft und Immunität, Springer-Verlag Wien, 1953). Thus, inflammation results from a slackening of the blood circulation in capillaries and venules, tending to a standstill (stasis). An average inflammatory process signifies a peristasic circulatory disturbance, characterized by a pre- and post-stasic retardation of rather long duration and a short stasis. Tuberculous inflammation, however, is often distinguished by a prestasic slowing down of very long duration, associated with profuse plasmatic exudation ("nutritive effect of the inflammatory circulatory disturbance") and, therefore, with a considerable cellular proliferation ("proliferative effect of the prestasic slackening"). The lower the virulence of tubercle bacilli, the more prolonged will be the prestasic stagnation of the blood circulation, and the more conspicuous the subsequent cellular proliferation.

If, in the course of a tubercular inflammatory process, stasis develops, we deal *mostly* with a permanent interruption of the blood supply, inducing necrosis. Since the prestasic slackening—characterized by vasoconstrictor paralysis and intense excitation of the vasodilators—is very easily transformed into stasis—characterized by the paralysis of both vasomotor systems—it is understandable that lymphonodogenic aspiration-infiltrations often become subject to necrosis and disintegration ("destructive effect of the inflammatory circulatory disturbance").§

The following remarks related to reactions appearing subsequent to *increased inflammatory susceptibility* may be added: In these cases we mostly deal with processes in tissues which became sensitized by infection or by the introduction of protein substances. We believe that the increased inflammatory susceptibility ("sensitization") signifies increase in the vasomotor tonus:¶ In the preinflammatory phase of the hyperergic process, the vasoconstrictor

§ There also exists a marked "cellular infiltrative effect" of the common inflammatory circulatory retardation, causing a prestasic erythro- and a pre- and post-stasic leucodiapedesis into the affected tissue. This aspect of inflammation is, in tuberculosis, less conspicuous than the proliferative and the destructive character.

¶ Our assumption is mainly based on experimental investigations carried out by Ricker and Dietrich-Nordmann; also see Kalbfleisch and Homuth.

nerves are intensely excited, perhaps even paralyzed, and the dilators are in a state of highest excitation. Therefore, minimal, additional, specific irritation suffices to induce the inflammatory circulatory disturbance with all its typical attributes, that is, exudative, cellular-infiltrative, proliferative and destructive phenomena. We assume that in tissular territories in, for example, a tubercular animal, in which the inflammatory susceptibility has reached its climax, the vasoconstrictor nerves are already paralyzed, the dilators evidencing maximal excitation, so that the superinfection may immediately produce a permanent stasis, accompanied by necrosis. In contrast, in areas in which the inflammatory susceptibility (sensitization) has not attained its highest degree during the preinflammatory period, constrictor excitation and slight dilator excitation prevail, which implies that following the superinfection, constrictor paralysis and most intense dilator excitation develops, that is, a prestasic circulatory slackening of long duration, accompanied by its typical exudative and proliferative effects.

If, in the blood of an animal, microbes (Issaeff; Pawlowsky; Rich; Quednau; Miescher and Böhm) or particles of a dye (MacCurdy and Evans, McLellan and Goodpasture; Siengalewicz; Bocan, Winternitz and Evans; Winternitz and Hirschfelder; Okuneff; Kusnetzowsky; Menkin) circulate, their intense accumulation may be observed in an experimentally-produced inflammatory focus. This *inflammatory fixation-phenomenon* occurs in tubercular animals subjected to superinfection after a proper interval. Foci produced by the superinfection then contain large amounts of tubercle bacilli in histological sections; we assume that these foci also become saturated with immune bodies.

A new aspect of this problem was demonstrated by Opie (1924): he observed that a foreign protein substance, employed as sensitizer (antigen), remains fixed within a reinjected area. Opie explained this phenomenon as the expression of an antigen-antibody-reaction. We assume, however, that sensitizing with antigen causes—just as a preinfection—an increase in the vasomotor tonus; thus a new injection of the same substance, administered appropriately, results in local prestasic stagnation or stasis in the affected cutaneous area, accompanied by a vasoparalytic fixation phenomenon.

A pulmonary fixation phenomenon can be produced under conditions which clearly indicate a purely nerval change of the blood circulation: A simple intravenous injection of india ink, or trypan blue, causes the storage of these substances in the spleen, liver and bone marrow. If, however, simultaneously a certain quantity of

adrenalin is injected these dyes accumulate in the lungs, evading other organs almost completely. Löffler explained this observation as follows: Intravenously given adrenalin causes peristasic pulmonary hyperemia, i.e., a stagnation of the blood in pulmonary terminal vascular branchings, accompanied by progressive increase, sedimentation and storage of the colloidal dye particles.

III. REMARKS ON EXPERIMENTAL INVESTIGATIONS RELATED TO REVERSIBLE INFLAMMATORY PULMONARY INFILTRATIONS IN TUBERCULOSIS

In experimental investigations carried out with Bieling, we injected the testes of rabbits with bovine or human tubercle bacilli—living and killed—and, with certain fragments or compounds of these agents. (See our first paper of this series in Arch. Ped., Vol. 75, p. 315, 1958.) Three weeks later we gave the same animals, intravenously or intratracheally, living or dead bacilli, or their fractions. A number of animals treated in this way died of an anaphylactic shock during the first days after the second injection. We observed, in all experiments, the development of very extensive pulmonary infiltrations, which, if the animal survived certain critical periods, gradually disappeared. We assumed that the first treatment increased the susceptibility (sensitivity) to inflammatory reactions from living and dead tubercle bacilli and their fractions. Thus, the anaphylactic shock and the rapid development of extensive pulmonary changes after the second treatment were considered to be the expression of hypersensitivity. We interpreted the healing of the pulmonary infiltrates produced by superinfections as proof of the presence of a potent defense at the time of the administration of the superinfection.

We were able to follow radiographically the development and the disappearance of the pulmonary condensations produced by superinfections in sensitized animals. (See Fig. 8 of our first publication, in Arch. Ped. Vol. 75, p. 326.) The sudden development of diffuse pulmonary condensations and then their progressive disappearance strongly suggested similarities between these experimental observations and "epitubercular" changes in human pathology. Oppenheimer reported (in 1935) on analogous results obtained by intratracheal administration of dead tubercle bacilli in sensitized (preinfected) rabbits.**

Histologic and microbiologic investigations concerning the *amount of tubercle bacilli in the lungs of pre- and nonpre-infected animals subjected to single or double infections* resulted in the following observations:†† Rabbits receiving testicular infection with

** Oppenheimer's investigations were promoted by Rich and McCordock's experimental experiences and by Rich's post-mortem observations in which spontaneous healing of caseous lymphonodogenic aspiration-infiltrations occurred.

bacilli of a human strain‡‡ and killed 21 days later, evidenced, in microscopically-small metastatic pulmonary infiltrates, very few tubercular bacilli. In the minute, only microscopically-visible pulmonary foci of rabbits infected intravenously with bovine bacilli,¶¶ we counted, on the first day after treatment, scattered germs, still often located intravascularly in small lumps. Then, after the second week, parallel with a rapidly progressing caseous tuberculous infiltration, characterized by extensive necroses, we observed the lively multiplication of the bacilli. All animals of these series perished no later than seven weeks after the infection, displaying a severe generalized tuberculosis. During the last days before death, a sudden deterioration of the general condition occurred, followed by prolonged prostration. Pulmonary foci of animals of these series, killed four to five weeks after the infection, before manifesting the sudden deterioration, or just after the appearance of its first symptoms, contained extraordinarily large amounts of tubercle bacilli, sometimes almost as in a bacilli culture. Remarkably, the pulmonary infiltrations of many of those animals perishing spontaneously contained, however, only a very few germs. We concluded that a great number of tubercle bacilli are subjected to destruction during the agonal period.

This phenomenon may be observed also in rabbits which were intravenously infected with large doses of virulent (bovine) bacilli, 21 days after a standard testicular infection. We mentioned that a great many of these twice-infected animals expired in a severe condition similar to anaphylactic shock on the first or second day after the superinfection. Details of our observations will be described in another paper. Here it is of importance to stress that the essentially fatal intravenous infection proved to be innocuous in pre-infected animals surviving the shock period: The characteristic pulmonary infiltrates contained very few, scattered germs and eventually the animals recovered completely.

In their experiments, Bieling and Oelrichs observed that the pulmonary accumulation of bacilli, during the first hours after the intravenous injection, is much more intense in pre-infected animals than in nonprepared rabbits.*** We consider these findings to be the expression of an inflammatory fixation phenomenon.††† Soon, however, the remarkably high number of germs decreased and

†† After the present author with Bieling, in samples taken offhand, obtained characteristic histological findings, Bieling, in collaboration with Oelrichs, followed the fate of intravenously-administered germs by microbiologic methods. (1935; 1941). Later, the present author, with Esen, in a systematic investigation, histologically established the amounts of germs in pulmonary foci for all animals described in his monograph ("Empfindlichkeit und Schwindsucht." J. A. Barth, Leipzig; 1935). We will publish our results in a separate paper.

‡‡ Strain *TR* of the Farbwerke Höchst; 0.2 cubic centimeter of a suspension 1-25. Human bacilli are avirulent in rabbits.

¶¶ Strain *K 221* of the Farbwerke Höchst; 0.5 centimeter of a suspension 1-1000. Bovine bacilli are extremely virulent in rabbits.

eventually no bacilli, alive or capable of multiplication, remained. No doubt, here, we encounter the effect of a vigorous immunity.‡‡‡

In another experiment,¶¶¶ the testicular infection was performed with smaller doses of virulent (bovine) bacilli; 21 days later, we introduced intratracheally a rather large amount of partial substances of killed germs. Giant aspiration-infiltrates developed already during the first days after the "superinfection," (Fig. 4), containing enormous masses of bacilli. No doubt, these germs accumulated in direct sequence to the superinfection, transported by the blood-stream from the active testicular tuberculosis and its metastases. In these instances, too, we experienced the expression of an inflammatory fixation-phenomenon. We observed similar pathogenetic conditions and identical alterations in some instances of human pathology. (See Group II, Case 1 and Group III, Cases 1 and 6).

These observations made it possible to define the pathogenic conditions of extensive reversible infiltrates produced experimentally:

1. An interval of 20 to 25 days is necessary between preparatory treatment (sensitizing) and superinfection. In this time the inflammatory susceptibility (sensitivity) of the lungs reaches its highest degree and arrives at the level at which an extensive pulmonary infiltration may develop after the administration of an appropriate superinfection.

2. Also essential is the presence of a potent immunity, which paralyzes and then destroys the tubercle bacilli as soon as they are introduced into the sensitized organism, as in Bieling-Oelrichs' experiment. Thus, we understand that the pulmonary disease resulting from an experimental superinfection is a reversible one, because it develops—so far—not as an effect of virulent agents, but mainly through microbes checked by immunity and substances produced by the disintegration of the germs.

3. The necessity of a suddenly-occurring superinfection which introduces a substantial quantity of living or dead agents, or of appropriate fractions of killed bacilli.

In our experiments we encountered two types of reversible pulmonary infiltrations: (1.) Diffuse, chronic, pneumonic conditions

*** Bieling and Oelrichs sensitized by injecting large amounts of killed tubercular bacilli into the testes of rabbits, thus avoiding the possibility of a mistake in the characterization of the germs found in the lungs of superinfected animals. The intravenous superinfection was administered by fatal doses of virulent (bovine) bacilli.

††† Freund and Angevine observed a similar occurrence: In immunized animals, after a superinfection, more bacilli were present within the affected skin area during the first hours than in controls.

‡‡‡ Rist and Rolland observed, as early as 1914, that tubercle bacilli disintegrate after injection into the skin of pre-infected animals, and that the area of the superinfection becomes sterilized. Lurie (1928) confirmed this phenomenon. The correctness of this observation is obvious also, according to Rich: he found the disappearance of germs, in some cases, so marked that even in serial sections isolated bacilli could be detected only by prolonged meticulous search.

¶¶¶ Which we mentioned in our previous paper: Tuberculosis in Childhood, Arch. of Pediatrics, 75:315, 1958 (see Fig. 10 of that publication).

which morphologically correspond to the "desquamative pneumonia", "splenopneumonia", and are characterized macroscopically by a rubber-eraser-like consistency, and microscopically, by the almost complete absence of tubercular structures and necroses (Fig. 7 in our first paper, in Arch. Ped., Vol. 75, p. 324); at any rate, necroses are not predominant in these cases. This type of pulmonary infiltration, resulting from superinfections, actually may heal without leaving defects or cicatricial deformations worth mentioning. We observed this form of pulmonary condensation in experiments in which the second infection was administered intravenously, that is, in cases in which the pulmonary tissue, at the highest level of inflammatory susceptibility (hypersensitivity), had been contacted by the agents in innumerable locations, but everywhere in small quantities. Similar changes occur also in human pathology. (See the case of Fig. 6 of our previous paper, in Arch. Ped., Vol. 75, page 463). (2.) There are extensive infiltrations displaying a pronounced lobar tendency and characterized by massive necroses (Fig. 5 and 10 in our first paper, in Arch. Ped., Vol. 75, p. 322 and 329). We encountered this type of reversible pulmonary infiltration in cases in which the second infection introduced large masses of bacilli (or their compounds) intratracheally —that is, in which the sensitized pulmonary tissue sustained the attack of a great number of agents concentrated in relatively few locations. In these cases of the experimental reversible pulmonary disease, the healing sometimes occurred after the development of very large cavities (Fig. 6 in our first paper, in Arch. Ped., Vol. 75, p. 323), and after an extensive cicatrization had produced considerable deformation.

It is noteworthy that in instances in which, for the second treatment, we used no living bacilli, necroses developed only in those areas contacted by the highest concentration of the intratracheally-administered dead agents, or their fragments (Fig. 10 in our first paper, in Arch. Ped., Vol. 75, p. 329). Rubber-eraser-like infiltrates, containing only cells, are characteristic also of infections with avirulent tubercle bacilli in non-sensitized animals; however, in these cases too, we always observed necroses and dissolution processes in areas where great masses of tubercle bacilli had contacted the pulmonary tissue. On the other hand, in sensitized animals large necroses and cavities always developed, regardless of whether the superinfection had been made by virulent or avirulent agents, depending only on the quantity of tubercle bacilli given at the second treatment.

These observations show that under certain conditions avirulent germs may induce extensive, even lobar necroses and disintegra-

tion, that is, changes which we traditionally consider as signifying aggravation of the phthisis and an unfavorable prognosis—although they are characterized in these cases by a predominant disposition for healing. On the other hand, we observed that virulent tubercle bacilli given intravenously, or intratracheally, after an interval following a preparatory treatment, behave as avirulent agents; that is, they induce a disease which heals after reaching, in a relatively short time subsequent to the superinfection, the maximum of its extension and the highest degree of its destructive capabilities.

All these experiences disclose that—at least in animal experiments—necroses, softening processes and cavitation in general, even if very extensive, signify not a malignancy of the disease, but the effect of relatively large quantities of tubercle bacilli and their substances, or the presence of a high susceptibility to inflammatory reactions. Similarly, the manifest healing tendency of a tubercular lesion does not prove definitely the benignity of the process, but can be considered only as an indication of the fact that effective immunity is present.

GROUP I

HEALED MASSIVE AND CAVITATED LOBAR LESIONS OF TUBERCULOSIS ORIGIN

Case No. 1 (Fig. 1) A six-year-old boy died of tuberculous meningitis following postprimary lymphonodogenic reactivation. The autopsy (No. 10/48, Istanbul) disclosed a pin-head-sized calcified interbronchial lymph node of the right lower lobe, and up to bean-sized caseated-mesenterial lymph nodes as sequelae of the initial disease. The reactivation produced up to cherry-sized swelling and fresh tuberculosis of the bifurcation lymph nodes and of the paratracheal lymph nodes on the right side. (Lymph nodes of the left lung were not involved!) Old lymphonodogenic bronchial lesions were: (1) a stenosing, elongated perforative scar in the proximal sector of the right main bronchus, covered and surrounded by epidermized metaplastic mucosa; (2) cicatricial occulsion of a very short stump of the mutilated main bronchus of the right upper lobe. Absence of the entire right upper lobe was the most striking autopsy finding. A bean-sized lump of shrunken, devastated pulmonary tissue, connected with the stump of the mutilated main bronchus of the upper lobe, was considered to be a remnant of the right upper lobe. Extensive areas of cicatricially devastated pulmonary tissue were present in the middle lobe (aspiration-infiltrations healed by cicatricial contraction). Microscopic examination showed: (1) remnants of collapsed pulmonary tissue and diffuse fibrosis of devastated pulmonary areas in the right middle lobe. No tubercular structures were observed. (2) Devastated, fibrotic pulmonary tissue, with remnants of bronchi and of lymph nodes in the stump of the right upper lobe. We assume that the tubercular infection occurred and the lymphonodogenic pulmonary lesions developed 4-5 years before death.

A radiograph taken two weeks before death displayed enlarged paratracheal lymph nodes on the right side, as well as swollen lymph nodes of the right inferior lateral interlobar space; vascular shadows of the right lower lobe were located very high! The right upper field was filled by slightly fibrotic, however, aerated pulmonary tissue. The right lower lobe was emphysematous.

Remarks: We showed the radiographs of this case to some experienced radiologists: not one recognized the absence of the upper lobe!

Epicrisis: Four to five years before death, in the course of a primary infection, large, caseated lymph nodes discharged into the bronchial system of the right lung. An extensive aspiration-infiltration involving the entire right upper lobe developed and soon disintegrated. The subsequently appearing cavity collapsed, causing the disappearance of the right upper lobe. Aspiration-infiltrations of the middle lobe induced the development of cicatricially devastated areas. Emphysematous remnants of the middle lobe and the lower lobe filled the right thoracic cavity.

Case No. 2 (Fig. 2). The autopsy (No. 512/48, Istanbul) of a 43-year-old man, who died of hepatic cirrhosis, disclosed a cicatricial, residual condition of tubercular origin of the right middle lobe; no active tubercular foci were present. We observed: (1) extensive, typical, old deforming scars of the stem of the middle lobe bronchus and cicatricial obliteration of the middle lobe bronchus, subsequent to the discharge of tuberculous lymph nodes many years (decades?) before death. (2) The middle lobe (the size of which was reduced to the volume of a walnut) displayed intense shrinking and diffuse, hard fibrosis. On sections of the middle lobe, whitish strips of bronchi were visible, occluded by cicatricial connective tissue. Microscopic examination revealed the middle lobe to be almost completely devastated. Only a few remnants of pulmonary and bronchial (bronchiolar) structures were present. No tubercular foci. We believe that the tuberculous infection which caused the lymphonodogenic bronchial lesions and a subsequent infiltration of the middle lobe occurred in childhood, i.e., probably 40 years before death.

Remarks: We assume that—should the patient have survived—in 10-20 years a further shrinking of the middle lobe could have occurred.

Epicrisis: Many years before death, probably during the childhood of the patient, the right middle lobe was affected by a vast lymphonodogenic aspiration-infiltration of rubber-eraser-like consistency. Healing of this involvement caused the progressive cicatricial shrinking of the middle lobe.

Case No. 3 (Fig. 3). A 27-year-old male died of uremia following amyloid nephrosis. Autopsy (No. 7/52, Wrentham, Mass.) disclosed a cicatricial residual condition of tubercular origin, involving the right lung. No active tuberculosis was present. Post-mortem radiography displayed a few small, hard, calcified foci on both sides; some of them probably were sequelae of lymph-node tuberculosis. The following bronchial foci indicated the discharge of disintegrated caseotuberculous lymph nodes more than twenty years before death: (1) large centipede-like scar of the main bronchus of the right upper lobe; (2) large bridge-like scar, connecting the stump of the mutilated main bronchus of the right upper lobe with its branches, which were severed by the lymphonodogenic lesion; (3) large diverticular perforative scar of the right stem bronchus, directly above the orifice of the sup. dorsal bronchus of the lower lobe. Following pulmonary changes were observed: (1) cicatricial shrinking of the extensively cavitated right upper lobe; (2) similar, quite extensive changes of the apical sector of the right lower lobe. Microscopic examination showed fibrotic, completely devastated remnants of pulmonary tissue; no inflammatory processes. We assume that the tubercular infection occurred approximately 24 years before death and that the most important pulmonary lesions, described above, developed in the primary period of the disease.

Several clinical radiographs showed the beginning and early development of the tuberculous pulmonary involvement. According to these observations, the disease began in the left upper lobe. A large paratracheal lymph node on the right side became visible soon, preceding an extensive condensation of the right upper lobe. Small calcified foci within the right upper field appeared later. A pulmonary radiograph taken shortly before death was considered normal.

Remarks: The vertebral column was also involved during the initial period of the disease.

Epicrisis: More than two decades before death, in the course of a primary infection, large tuberculous lymph nodes discharged into the bronchial system of the right lung. An extensive aspiration-infiltration of the right upper lobe cavitated and healed, producing contraction and devastation of the pulmonary tissue, accompanied by bronchiectasis. Similar changes developed following another aspiration-infiltration affecting the apex of the right lower lobe.

THE PSYCHOSOMATIC SOMATOPSYCHIC NATURE OF SCHOOL CHILD GROWTH

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During the past decade the physical measurements of more than five thousands Saskatoon Public School Children have been recorded on Wetzel Grids.[1] Our method of recording involves also placing on the right-hand chart of the grid, in a manner previously described and illustrated,[2,3,4] in the chronological order of occurrence at the proper age level when these occurred: illnesses, remedial and prophylactic treatments, emotional disturbances, any known changes in the child's physical or emotional home environment, the child's annual school standing, the results of intelligence and standardized academic tests, and in fact, if space permits, a brief history as it occurs of the child's growth physically and mentally as it changes with environmental changes.

Study of these records revealed that under presently existing socio-economic conditions in our city during the age period at which the child is over seven years but not yet well into the puberty growth spurt:

1. Lag or lead on Wetzel grid records of these children in well over 60% of instances was preceeded by some known change in the emotional environment of the child which deprived or could be interpreted by the child as a threat to deprive it of normal parenthood. Parental death, divorce, desertion, insanity, chronic illnesses, etc., were followed by the occurrence of developmental lag or lead in about 75% of the cases where these catastrophies to childhood occurred.

2. The physical growth changes, when marked enough in extent in the individual (it would seem that lesser physical growth changes are required among hearty eaters), commonly were accompanied by a lowering in I.Q. of from five to ten points and/or, or of both, of annual school standing, the latter sometimes delayed several years.

It is the purpose of a study, still in progress, to assess the seriousness of the above observations to the school and to the child

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and particularly the interrelationships that exist between physical and mental growth among the nearly 10,000 public school children of Saskatoon's very rapidly growing about 80,000 total population.

Child physical size per se is of little consequence alone but if growth retardation is accompanied by mental retardation, either actual, as shown by intelligence test, or simulated, as shown by lowering of school standing, this is of increasing consequences in a world whose progress is increasingly dependent upon mind-power rather than muscle-power. Therefore a preliminary study was undertaken to observe the effects known deprivation had upon intelligence and school standing.

PRELIMINARY INVESTIGATION

There were 1136 children in our 1958 grade IV classes. Of these, 435 boys and 425 girls had had all of their grades I, II and III schooling with us. In our small city, which has doubled its population since 1945, if deprivation from normal home life occurs, it commonly becomes known to our medical and teaching staff and is recorded with the date of its occurrence. Among other data recorded on each child's record is its annual school achievement (grading) together with the results of any intelligence or standardized academic tests. It was a simple matter therefore to separate the known deprived in order to ascertain whether these children attained similar standing to that attained by children not known to be deprived at any time of normal home life.

Among the 860 children there were the following known cases and causes of deprivation by the time the child had reached grade IV:

	Numbers
I. *One-Parent Homes.* (death, divorce, adoption, institutionalization of one or both parents, etc.)	76
II. *Two-Parent Homes.*	
a. Mother employed full-time outside home longer than 6 months before the child came to school	27
b. Mother employed as above only after the child came to school	34
c. Homes so extremely disturbed they were reported to us by psychiatric clinics or social agencies	25
d. Known extremely unusual situations in the home (senile grandparent, hidden idiot sibling, husband's mistress living in home, etc.)	28
TOTAL	190

Although among the groups, children whose mothers were employed outside as in (b) above and children adopted in the first few weeks of life had higher than average school standing, for various reasons these children were retained among the deprived. The data gathered in this preliminary study revealed the following: (Tables I & II)

(A)

TABLE I: Numbers of Children with Their Standing

Average Standing 1st 3 grades	Non Deprived Children	Deprived Children	TOTAL
A	96	10	106
B	252	35	287
C	211	72	283
D	82	42	124
Failure	29	31	60
TOTAL	670	190	860

Deprived children fail their year more commonly: (Table II)

TABLE II: Numbers of children who fail at least once

	Never Failed	Failed Once or more	TOTAL
Not Deprived Children	597	73	670
Deprived Children	137	53	190
TOTAL	734	126	860

(B)

As is commonly known, girls were better students than boys, but only if they were not deprived of normal home life. Using a fifteen point scale in which A plus equals 15, the average standing for the first three grades is shown: (Table III)

TABLE III: Average Standing for the First Three Grades #

	Standardized Mean	Grading	Standard Deviation	Numbers
Non Deprived Boys	9.6977	C	3.1016	311
Deprived Boys	7.4646	D plus	3.0149	99
Non Deprived Girls	11.1209	B minus	2.9060	306
Deprived Girls	8.9702	C minus	3.0578	87

A few children had no intelligence test recorded. They were omitted from this table.

(C)

There was no significant difference in intelligence between the sexes in comparable groups but in each sex there is a difference in intelligence of deprived and not deprived children: (Table IV)

TABLE IV: Otis Mental Ability Test Results of the Aforegoing Children

	Standardized Mean	Standard Deviation	Numbers
Non Deprived Boys	103.0450	11.3358	311
Deprived Boys	98.9696	12.3389	99
Non Deprived Girls	105.7189	11.9055	306
Deprived Girls	100.6207	11.3908	87

(D)

Deprived children fail to use intelligence present to an extent that the correlation between I.Q and average standing becomes meaningless: (Table V)

TABLE V: Correlation between I.Q. and Average Standing

	Correlation
Non Deprived Boys	0.5980
Deprived Boys	0.5268
Non Deprived Girls	0.6799
Deprived Girls	0.5080

(E)

In 76 instances the age of the child at which parental death, divorce, etc., occurred was known. Intelligence test results (Otis Mental Ability Test administered while the child was in grade III) were as follows: (Table VI)

Age of Child When Deprived	Numbers	Mean I.Q.
8 - 5 years	24	106.2
4 - 3 years	13	102.5
2 - 1 year	16	102.3
1 - 0 years	23	98.0

Among the 23 children deprived in their first year of life there were 8 who had been successfully adopted in the first three weeks. The average I.Q. of the remaining 15 children in this group was 93.8. The average standing of children who had been deprived before they were five years old was considerably lower than would be expected from their I.Q. test results.

COMMENTS ON THE RESULTS OF THE PRELIMINARY STUDY

The noxious effects of deprivation upon scholastic attainment surprised us, because upon Wetzel Grid records there occurred following deprivation usually first of all growth speed changes and commonly only then, and not always, a retardation in scholastic and mental growth. Secondly, in more than half of cases in this study deprivation first occurred during infancy or preschool life. However, in our continuing study it is obvious that the effects of

deprivation upon mental ability cannot be ignored. Its effects appear to be two-fold: (a) firstly a lowering of the correlation between I.Q. and average standing and (b) possibly only among those most seriously affected by deprivation, a lowering of intelligence test scores when tested by group tests. The net results among large masses of the deprived studying the same curriculum in the various classes throughout the city is that:

1. There are too few A and B students among the Deprived and too many D students and failures.

2. There are far too many A and B students among the Non Deprived; more than half, 348 of 670, of these children are A and B students, whereas about 35% only should be A and B students *if they are adequately graded*. Among all 860 this results in 393 students graded A and B in place of an expected 286, yet stiffening the grading would obviously simply raise havoc with the Deprived.

3. Growth of intelligence appears to be retarded only when deprivation occurs in infancy and the early preschool period, or by extreme instances of deprivation later.

THE CONTINUING STUDY

Among the 1956 and 1957 graduates from grade VIII there were 421 boys, about 60% of all boy graduates, who had had all of their schooling with us and whose records contained data that was adequate for our purposes. The following data is from this latter study:

1.

TABLE VI: The Height of Boys at Nine Years of Age With Their Intelligence

[Otis Mental Ability Result (I.Q.s) same year.]

Height at 9 Years	Numbers	Standardized Mean	Standard deviation
49 inches	33	102.45450	12.9325
50 & 51 inches	84	104.26190	9.7725
52 & 53 inches	99	104.97975	11.5080
54 & 55 inches	72	108.11110	10.4760
56 inches and over	24	108.25000	

Where the difference in height is four inches or greater in the groups the difference in intelligence test results are significant. Eight boys whose height was less than 49 inches at 9 years possessed an average I.Q. of 105.7.

2. The average standing, using a fifteen point score as in the preliminary study, was calculated for each boy. All data about

each child was placed on Hollerith cards. There was the height, weight, an assessment of physical growth as plotted on the Wetzel grid, the age at onset and the type of refraction responsible for loss of visual acuity, the dental assessment, among girls the age of menstrual onset, together with numerous other data. Samples are given below.

TABLE VII: The Mean Height of Boys at Various Ages According to Their Average Standing in All 8 Grades at Public School

TEST RESULT	Excellent	Good	Fair	Poor	Bad	Average
(For brevity only certain ages are given)						
Height	Average Standing for All 8 Grades					
At	A	B	C	D		FAIL
6 years	46.9	46.0	45.4	45.3		45.2
8 years	57.7	50.7	50.0	49.9		49.9
10 years	55.5	54.8	54.0	54.3		53.9
12 years	59.3	59.0	58.2	58.1		57.8
14 years	65.5	64.3	62.9	63.8		63.4

TABLE VIII: Similar Weights with the Mean I.Q.s Below

Weight					
At	A	B	C	D	FAIL
6 years	52.3	48.0	46.6	44.9	46.5
10 years	77.3	73.7	71.9	71.8	70.9
13 years	108.4	103.1	98.0	97.9	99.8
I.Q.	119.3	111.8	104.9	102.2	93.8

3. As was stated, physical growth quality was assessed on Wetzel Grid in the groups given in Table IX. In this table the 405 boys with Otis Mental Ability Test results satisfactorily recorded are divided into three main groups according to intelligence as shown. Each group is then divided into five groups according to growth quality, and the average annual standing for all 8 grades is given for each sub-group. The child's actual height and to only a minor extent its weight at its recorded measurings have little or nothing to do with this table. Rather what is important is where the child went in height and weight from previous measurings.

TABLE IX: Mean Standing for 8 Grades According to Growth Quality

Otis A Mental Ability	Quality of Physical Growth					
Test Result	Excellent	Good	Fair	Poor	Bad	Average
110 or above	11.48	11.29	10.6	10.15	11.0	10.9
100 - 109	10.06	9.16	9.08	7.25	7.44	8.6
Below 100	8.22	6.58	7.23	6.64	4.0	6.5
Average	9.8	9.0	8.6	8.0	7.4	

The distribution of boys in the three I.Q. groups according to their growth quality on Wetzel grid is given in Table X. The distribution is significant at above the 5% point.

TABLE X: Numbers of Boys According to I.Q. and Growth Quality

Otis A Mental Ability Test Result	Quality of Physical Growth					
	Excellent	Good	Fair	Poor	Bad	Total
110 or above	27	49	33	27	3	139
100 - 109	18	37	36	49	9	149
Below 100	18	38	26	28	7	117
Total	63	124	95	104	19	405

The results shown in Table X are to be expected when it is remembered that when developmental lag occurs in sufficient severity there will occur a lowering of intelligence test score, and eventually of average standing. This would suggest that if children come of average size and continue to grow to average size their average standing and their I.Q.s would be superior to those of children who are smaller or who fail to grow normally, or both.

There were 128 boys who reached 46 inches at 6 years of age, and who grew to at least 62 inches at 13 years (the average height of boys 46 inches or taller is 62 inches at 13 years.) There were 79 boys who were 46 inches at 6 years but who failed to gain to 62 inches at 13 years. There were 139 boys whose height came to less than 46 inches at 6 years but who gained up to 59 inches or more at 13 years (the average height of boys coming under 46 inches at 6 is 59 inches at 13 years.) There were 75 boys who came less than 46 inches at 6 and who failed to grow to 59 inches at 13 years. In Table XI is given the average annual standing for all of their 8 grades of these four groups of boys.

TABLE XI: Average Annual Standing for All 8 Grades of Each Group

Average Standing	Numbers	Standardized Mean	Standard Deviation
Group I	128	9.87500	2.85482
Group II	79	8.82279	3.12090
Group III	139	8.56834	2.79464
Group IV	75	8.33333	3.07734

The average Otis alpha test scores for the above four groups are given in Table XII.

TABLE XII: Otis A Test Score of the Four Groups

	Numbers	Standardized Mean	Standard Deviation
Group I	110	107.73	10.34
Group II	62	105.23	6.0
Group III	114	104.06	4.09
Group IV	70	103.79	7.81

The difference in intelligence is not significant until it is as great as that existing between groups I and III while the difference in

standing becomes striking as soon as there is evidence of growth failure.

The four groups above were each subdivided into the Deprived and the Non Deprived. Unfortunately when this was done there was a great disparity of numbers in the various sub-groups. The same general observations as in Table X and XI were found but the significance was not studied. Deprived boys in each subgroup had lower standing than comparable Non Deprived Boys. Deprived boys of Group I, who maintained average growth of height were definitely superior students among the Deprived and achieved higher standing than Non Deprived Group II boys although this was lower than the standing of the same group of Non Deprived boys.

4. Because the more rapidly growing mature earlier, the onset of loss of normal visual acuity occurs earlier and possibly more frequently among the most rapidly growing. Table XII relates this with average standing for all 8 grades.

TABLE XIII: Loss of Visual Acuity by Grade VII Level Among 424 Boys

Average Standing	Numbers	Numbers with loss of acuity	Percent
A	16	9	56.25
B	148	45	30.4
C	130	29	28.71
D	89	20	22.47
Fail	41	8	19.57

Among the girl peers, the age of menstrual onset among those whose date of onset was accurately known varied with school standing as follows:

TABLE XIV: Numbers Menstruating by 12 years of age with their Average Annual Standing for All 8 Grades. (Age to nearest birthday)

	Average Annual Standing					
	A	B	C	D	FAIL	Total
Menstruating	17	39	21	8	1	86
Not Menstruating	12	77	52	23	5	169
Percent Menstruat.	58.6	33.6	28.7	25.8	16.6	

At the annual dental inspection the dentist records the dental state and recommends treatment when this is, in his opinion, needed. In very many instances prior to this inspection children have had dental inspection privately and have had needed treatments by the time the school dental inspection has occurred. Treatment is available free for those who qualify by a liberal means test. In Table XIV is given the distribution of children needing treatment during their first seven grades at any inspection, with their average annual standing for all eight grades.

TABLE XV: Numbers of Cases (Among 402 Boys with adequate records) Needing Dental Treatment at annual inspections together with Annual Standing

Average Standing	No Treatment Needed	Treatment Needed	% Not Needing Treatment
A	6	8	42.8
B	38	109	25.8
C	33	93	26.2
D	11	71	13.1
Failures	6	27	18.2

DISCUSSION

In a previous report[5] we demonstrated that Saskatoon Public School children had increased in height and weight and had improved in nutritional state (weight for height) with the net results that thinness had markedly decreased while obesity had even more noticeably increased between 1936 and 1956. In addition, in that report we had roughly demonstrated that the more rapid growth of body which had occurred was accompanied by earlier average sexual maturation with its concomitant changes in emotional make-up at an earlier age, by an earlier loss of visual acuity and by more rapid intellectual growth between 1946 and 1955 as measured in both years by Laycock Mental Ability test results.

We prefer, in considering child growth, to divide this into three broad aspects: of body, easily measured; of intellect and of personality. While intelligence tests may accurately measure innate intelligence only while the individual being tested is functioning at maximum efficiency at the particular time of test, nevertheless the test result is at all times also a measurement of the functional ability of intellect at time of test. There was no data recorded of personality measurement on our records, except for a very few of those referred for psychiatric examination. However we did have fairly reliable data about the key environment of each child which it is agreed is paramount in importance in the development of the personality. We had recorded for each child any known specific event in the child's life which might be expected to deprive it of normal full-time mothering by the natural mother and the date of its occurrence and the duration of the event. It is obvious that if a specific event either partially or completely deprives the infant or young child of full-time mothering by its natural mother the development of the child's personality may be retarded, particularly in that aspect which is most rapidly developing at the time the specific stressful event occurs. Division of mothering, particularly when the mother-substitute is primarily hired to do housework, rarely

is fully successful. We could then, measure the effect of, as it were, the time loss of natural mothering, in place of using personality measurements, upon average school standing (grading) and upon academic and intelligence tests.

For some time, particularly since our observations of the aforementioned Wetzel grid records, we believed that in large masses of children there existed so close an interrelationship between the three aspects of growth that this could be demonstrated. In our preliminary study it is obvious that conditions in infancy and early childhood which deprive the child of normal full-time mothering and hence of this catalyst needed for full personality development measurably lowered the child's ability to use efficiently its intellectual capacities for even so short a period as the first three grades of school. Its long term needs for higher standing for its known intellectual ability than was obtained could not be met. Among most deprived children, those suffering from lesser effects of deprivation, greater efficiency during the relatively short duration of an intelligence test could be maintained and hence these children could score higher with intelligence tests than did children suffering more severely from deprivation, although over the three years they could not maintain this efficiency sufficiently to attain comparable academic standing, and thus the correlation between their standing and their I.Q. sank until it became meaningless. Among those suffering most from deprivation it was obvious that the earlier lack of mothering occurred, particularly if the child was under two years of age, then not only was personality formation seriously damaged but there was also serious damage to intelligence, as measured by test:

Many volumes have been written about the development of the personality. For brevity we quote Bowlby[6]: "The development of the personality is a process whereby we become less and less at the mercy of our immediate environment and of its impact upon us, and more and more able to pursue our own goals, often over long periods of time, and to select and create our own environment. Such a process implies, among other things, a capacity to abstract common properties, to think in symbolic terms, and to plan ahead. . . . Only when this abstract attitude is developed has the individual the capacity to control his wish of the moment in the interests of his own more fundamental long-term needs. . . .

"The psychic machinery which we develop within ourselves to harmonize our different and often conflicting needs and to seek their satisfaction in a world realistically apprehended is our ego.

Its functions are many and include appraisal of our long-and short-term needs, their arrangement in priority, the inhibition of some and the acceptance of others, so that action may be purposeful and integrated instead of haphazard and self-frustrating. Because one of our foremost long term needs is to remain on friendly and co-operative terms with others, we must keep their requirements firmly in the front of our minds: and so important is this for us that we differentiate, within our ego, machinery specially designed for the purpose—our conscience or super-ego. It is evident that both ego and super-ego are absolutely dependent for their functioning on our ability to maintain the abstract attitude and it is not surprising that during infancy and early childhood these functions are either not operating at all or are doing so most imperfectly. During this phase of life, the child is therefore dependent on his mother performing them for him. She orients him in space and time, provides his environment, permits the satisfaction of some impulses, restricts others. She is his ego and his super-ego. Gradually he learns these arts himself and, as he does so, the skilled parent transfers the roles to him. This is a slow, subtle, and continuous process, beginning when he first learns to walk and feed himself and not ending completely until maturity is reached."

It is then, easily understood how the absence of the mother from the life of the infant and young child can hinder full personality development and how, as ego development is retarded considerably by the more serious forms of deprivation among our children, intelligence test score is lowered, while among children with lesser degrees of deprivation the long-term need of scholastic standing comparable with intelligence cannot be fulfilled.

We have been privileged to have had the opportunity of studying the scholastic records of 254 undergraduate students at the University of Saskatchewan who were formerly Saskatoon elementary school students. Although a statistically insignificant portion came from disturbed and broken homes (this was striking) nevertheless a proportion had Wetzel grid records with growth disturbances similar to those that may occur after severely stressful specific events, and in many instances we knew the nature of these. We rapidly noticed that students with developmental lag were efficient students at university only when they were within certain faculties or registered in certain parts of a faculty. As might be expected from Table X herein, because the grid records of the university students as a whole possessed an excellence as a group that is only seen among students in elementary school classes

for students of higher intelligence, minimal amounts of developmental lag assumed an importance we were not accustomed to attach to this, because the presence of such a lag during the childhood of students registered in predominantly purely science or mathematical subjects became associated with lowered standing compared with intelligence test records. For instance, in Home Economics there existed a broad pathway to graduation from university: on the other hand the student could pursue a course almost entirely in science subjects; on the other, science subjects, except for an elementary smattering of science, could be avoided in favor of such subjects as "display of goods, dress designing, etc." The girl who had developmental lag on her grid, even though her school and university tests show more than adequate intelligence, did very poorly if she had chosen the science pathway, but usually very well if she chose the non-science type of course. A similar situation existed in engineering and in arts.

Because of the above observation in the continuing study we paid particular attention to the record of performance of the students with the Gates Reading Test and the Dominion Arithmetic Test. Reasoning ability is required for a high score with the Gates Test while the Arithmetic test is based largely on mechanical arithmetic skills. Among boys both the Deprived and the Non Deprived score above the norm, but as follows:

	Advancement In Months	
	94 Boys from broken or disturbed homes	204 Boys Non Deprived
Dominion Arithmetic Test	4.5	2.5
Gate Reading Test	1.2	5.7
Mean I. Q.	103.77	105.56
Standard Deviation	12.03	10.67

The Gates test was administered while the boys were in grade VI and the arithmetic test while in grade VII.

Although there is no significant difference in intelligence between the two groups it could be suggested that deprivation of mothering among the Deprived has retarded their personality formation (changed their "natural aptitudes") so that the Deprived with their inferior ego formation lack some of the reasoning power essential to superior performance with the Reading test, yet do very well in the mechanics of arithmetic.

While we may have failed to directly demonstrate that there is any close relationship existing between personality development and intellectual and physical growth, we have demonstrated that

there is an important relationship between conditions in the child's home life that are essential to full personality formation and intelligence and mental performance in school, and between these latter two and physical growth.

The importance of interrupted body growth to Education as demonstrated in Tables VII to XI may again be emphasized as follows: the mean standing for all 8 grades of boys in the continuing study was 8.9764 or almost C. The mean I.Q. was 105.4. Of the 128 who reached 46 inches at 6 years and grew to 62 inches at 13, 79 boys were above C standing. There were 121 boys whose I.Q. scored 105. or higher. Of these, 66 boys were above C standing. We can usually maintain normal growth by adequate care.

CONCLUSIONS

If full care of children extends into the psychosomatic field as it does today, then it may be strongly suggested from the data presented herein that within the three aspects of child growth previously mentioned a somatopsychic relationship is the most important because only when uninterrupted body growth occurs can the brain grow fully and be efficiently used for all 8 grades of schooling. The aphorism of grandfather's day, "A sound body makes a sound mind", together with many other of his attitudes towards the importance of the family, may contain more truth for the welfare of our civilization than we today are prepared to face.

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SERIOUS INFECTION IN THE SPLENECTOMIZED PATIENT

Case Report with Notes on Hereditary Spherocytosis

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Major infectious disease has been noted to occur frequently in the patient who has had splenectomy. The concept that absence of the spleen is associated with an increased incidence of serious infection has arisen largely from observations on splenectomized patients presenting infections and from a large body of experimental data linking the spleen with resistance to infection. Only after long follow-up of large numbers of splenectomized patients may this concept eventually be validated. However, the presumption is very strong that such is the case.

These major infections have been of bacterial origin and have been reported to occur predominantly in children rather than adults. By far the greatest number arise within the first two years after splenectomy, although the range is great. Meningitis is the most frequent clinical manifestation and the pneumococcus is the predominant pathogen. The reader is referred to the definitive summary of the literature, case presentations, and discussion presented by Smith, et al[1] in 1957. It is of interest to note that serious infections have occurred in patients who have had splenectomy for traumatic rupture of the spleen as well as for hematologic abnormalities. Also, reports of infections in patients with agenesis of the spleen have appeared recently;[2,3] and it has been suggested that serious infections in a cyanotic infant should call to mind the entity of asplenia with cardio-vascular malformations.[4] Furthermore, thorough hematologic evaluation may give additional evidence of splenic absence.[5]

There were some thirty-six cases of splenectomized patients with serious infections recorded in the literature as of March 1957. Seven more were described by Huntley in 1958.[6] The present paper describes another such patient—a case of overwhelming pneumococcal infection in a patient splenectomized for hereditary spherocytosis. A brief discussion of the basic hematologic disorder and indications for splenectomy are presented.

CASE REPORT

K. M., a six year old white female was admitted to the 4756th USAF Hospital on 11 October 1958 with an acute illness which

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began on the day of admission and which was characterized by fever and delirium.

The patient had been evaluated two years previously in another hospital for anemia (see Fig. 1) and a diagnosis of hereditary spherocytosis had been made on the basis of (1) anemia refractory to hematinics, (2) splenomegaly, (3) positive family history, (4) hyperactive red blood cell maturation, (5) increased red blood cell osmotic fragility, (6) compatible red cell morphology, and (7) negative direct Coombs test. She had been anemic since one year of age (hemoglobin 7-9 gm%) and was subject to many upper respiratory infections. She had always been retarded in height and weight. Because of these factors, splenectomy was done. Following this, the patient gained weight and was said to improve in color and energy.

FIGURE 1—Laboratory Data on the Patient in 1956, Prior to Splenectomy

Hgb	7.0 gm %
Hct	21.90 %
RBC	3.3 million
Retics	6.5 %
Direct Coombs —	Negative
Peripheral — Smear	Much anisocytosis and poikolocytosis; occasional spherocytes and macrocytes; polychromatophilia
Osmotic fragility:	Hemolysis starts .55%, complete .1% with abnormal shape of curve
Blood group:	$\overline{O}$ positive

The morning of the day of admission, the patient was taken to a local medical doctor because of fever and confused behavior. His examination was unrevealing save for an oral temperature of 104.7 degrees F. and the patient was transfered to the above hospital without having received medications. On arrival there the patient was acutely ill, highly febrile, disoriented, and thrashing about. There were no sources of acute infection found on physical examination. The lungs were clear; pharynx and tympanic membranes were within normal limits; the skin was clear, and there were no meningeal signs detected. The abdomen was soft and non-tender; a left upper quadrant splenectomy scar was present. The patient was admitted, had a brief generalized convulsion, became apneic, and died despite emergency measures including oxygen, artificial respiration, and intracardiac epinephrine. Because of the rapidity of the death, little in the way of diagnosis or therapy was accomplished. White blood count was 24,000 cells per mm with a "high percentage of neutrophils."

Post mortem examination was performed within one hour of death. There was an early left lobar pneumonitis, surgically absent spleen, and slightly enlarged liver. Aside from an equivocal degree of cardiac enlargement, the remainder of the organs were

normal including the brain. Sterile specimens of heart blood, lung aspirate, and cerebrospinal fluid were obtained for culture and all revealed a heavy growth of pneumococci at twenty-four hours. The organism from the lung was further identified as pneumococcus type 18.

DISCUSSION

This patient sustained overwhelming pneumococcal infection which was fatal within ten hours of the onset of symptoms, two years after splenectomy for hereditary spherocytic anemia. As such, it falls into the group of cases recently described by Smith, et al[1] in which infection was fulminating and demise so rapid as to preclude detection of the infectious agent before death. Although it is now felt that absence of the spleen does predispose to bacterial infection (especially pneumococcal), there is no good evidence that these infections, once established, differ in their response to treatment. Thus, it is felt that appropriate antibiotic therapy administered in large doses within the first few hours after the onset of symptoms in this case would probably have been lifesaving. The simultaneous occurrence of sepsis, meningitis, and pneumonitis were uncovered in retrospect by post-mortem examination. Presumably the sequence of infection was from lung to blood to meninges. Pneumonitis is not stressed in the literature as a frequent offender in the splenectomized group; hence its occurrence here is of interest.

It is unfortunate that time did not permit further diagnostic studies in this patient. Determination of serum protein fractions (gamma globulin) would have been of great interest, especially in view of the patients increased incidence of respiratory infections prior to splenectomy. However, gamma globulin levels were not abnormally low in the group of patients reported by Smith, et al.[1] It would likewise be desirable to study properdin levels in these patients. Normal antibody production in response to tetanus antigen was demonstrated in splenectomized patients by Myerson et al.[7]

It has been generally considered that for the patient with hereditary spherocytosis splenectomy should be done in all but the very mildest cases and that this should be carried out at an early age, perhaps before four of five years of age. The threats of crises in the disease, the development of gall stones, and other effects of chronic anemia have been the factors responsible for this opinion.

The results of splenectomy in this disease are uniformly good. Aside from the very slight operative mortality, there has been no reason to withhold such an excellent therapeutic measure. However, as evidence accumulates indicating that splenectomized patients[1] are peculiarly prone to serious infections, it would perhaps be wise to delay elective splenectomy and certainly to follow all splenectomized patients very closely throughout their childhood. A primary disease considered to increase the susceptibility to infection was present in five out of seven of Huntley's patients who developed serious infections after splenectomy;[6] she emphasizes the importance of the basic disease in this susceptibility. Perhaps, since so many of the infections are pneumococcal, a case could be made for continuous antibiotic (penicillin) prophylaxis in these patients, at least through the childhood years. Most of the infections have occurred in splenectomized children rather than adults.

In accord with the theory that hereditary spherocytosis is transmitted as a mendelian dominant, fifty per cent of the progeny of an affected parent would be expected to have the disease. In actuality, less than this number of siblings are found to be affected and at times parents of hereditary spherocytosis patients are found to be normal. It is not known whether this is due to variability of gene expression or to the existence of forms of the disease which are not detectable by usual blood examinations. Perhaps incubation of red cells prior to osmotic fragility testing as emphasized by Young[8] will increase case finding.

TABLE 1

Clinical Finding		Anemia	Peripheral Smear	Osmotic Fragility	
				Initial Hemolysis	*Complete Hemolysis*
Patient (K.M.)	Patient	Present	Occasional Spherocytes; Polychromasia	.55	.3
Father (J.D.M.)	Intermittent Splenomegaly	Absent	Some Anisocytosis few Spherocytes	.48	.38*
Sibling (J.T.M.)	18 year old white male splenectomy in teens (why?)	Absent	4+ Spherocytes with Anisocytosis 20%	.44 .50	.38* .38*
Sibling (T.G.M.)	16 yea. old white male	Absent	Spherocytes with Anisocytosis		

* Control: Initial hemolysis .44%
Complete hemolysis .34%

Note the relatively normal osmotic fragility of Sibling J. T. M. who had splenectomy presumably for hereditary spherocytosis. Decreased osmotic fragility may be expected after splenectomy and may account for the now normal value. Some authors,[9] how-

ever, feel that osmotic fragility in Hereditary Spherocytosis patients remains permanently fixed.

This patient's family tree is notable for the large number of persons probably affected with hereditary spherocytosis. Although the information is incomplete, it seems that one hundred per cent of the offspring of this patient's father are affected, either by virtue of clinical disease or laboratory abnormality. (Table 1). Likewise, an unusual frequency of the disorder is probably present in the offspring of the paternal grandparents (three out of five affected). An attempt is being made to study these relatives further.

SUMMARY AND CONCLUSIONS

A case of fulminant, fatal, pneumococcal pneumonitis, sepsis, and meningitis is described in a six year old white girl who had splenectomy performed two years previously for hereditary spherocytosis. The rapidity of progression of the infection from health to death within ten hours was striking.

Such cases as this provide mounting clinical evidence that the splenectomized patient is unusually susceptible to major infections. The nature of this decreased resistance is not yet clear. This case emphasizes the need for careful follow-up of all splenectomized patients and early adequate treatment of their infections.

Some aspects of hereditary spherocytosis and the indications for splenectomy are discussed.

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PRELIMINARY TRIAL OF A NEW MUSCLE RELAXANT

N-isopropyl-2-methyl-2-propyl-1, 3-propanediol dicarbamate (SOMA)* IN OUTPATIENT CHILDREN WITH CEREBRAL PALSY

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Sound scientific principles militate against the hasty publication of the results of trials of new treatments and methods. When a new drug appears that gives promise of decreasing suffering and shortening a long and painful period of treatment, it may be possible to render a service by reporting even preliminary findings. We hope that other investigators will be encouraged to undertake studies of the new agent and publish their results. It is with the intention of sharing such a promising therapeutic lead that this brief report of a preliminary, uncontrolled study of a new muscle relaxant is offered.

Soma is a new propanediol derivative, N-isopropyl-2-methyl-2-propyl-1, 3-propanediol dicarbamate, which has been found to be several times more effective than mephenesin or meprobamate as a relaxant of skeletal muscle. After preliminary clinical trials had shown the drug to be unusually low in toxicity and side-effects, the manufacturers suggested a trial in outpatient cerebral-palsied children. The authors then undertook a preliminary evaluation among their office patients. Also included in the study were some patients of the Easter Seals Clinic, Morristown, the United Cerebral Palsy Treatment Center, Perth Amboy, and Hudson County Cerebral Palsy Treatment Center, Jersey City, N. J.

The compound was tried in 77 patients (46 boys and 31 girls).

* Soma (formerly W-712 was furnished through the courtesy of Wallace Laboratories, New Brunswick, N. J.)
** Director of Child Neurology Clinic, Morristown Memorial Hospital; Medical Director of Easter Seals Rehabilitation Center, Morristown, N. J.
*** Founder, Children's Rehabilitation Institute, Inc., for Cerebral Palsy.

Though the ages ranged from 13 months to 25 years in one case, the great majority were children rather than infants or young adults. There were 27 spastics, 11 rigidities, 34 athetoids, 2 ataxics, 1 child suffering from tremor and 2 from an unknown degenerative disease of the nervous system. All degrees of disability were represented. The greater part, however, were severe cases whose slow or negligible progress had caused discouragement in both the parents and the patients themselves.

The etiology included midline developmental defects resulting in cerebral palsy; prematurity; Rh incompatibility and difficulties at birth, including anoxia or hypoxia.

A rather large proportion of athetoids was purposely included in the group by one of the authors because the problem of the care of athetoids in the home is very great due to their constant motions.

Parents were instructed to administer the drug as directed. One 250 mg. capsule three times a day was prescribed for 39 patients; for 38 the dosage was begun at two 250 mg. capsules per day each and later increased to two 350 mg. tablets per day. The parents were asked to make regular reports of their observations. They were told the medicine would not harm their children, but that it was not known whether it would do them any good. They were asked to be very strict in their appraisal of the drug's effect and to give it credit only for clear evidence of improvement.

The parents of a number of patients living at some distance from the doctor were asked to make reports by letter at intervals of no longer than a month. To insure that this would be done, only a month's supply of the drug was issued at a time to these parents.

Regular examinations were made periodically by physicians. Blood counts and urinalyses were done for patients attending clinics. Physical therapists and others treating the patients also reported their observations during the time the drug was being taken. Finally, many of the patients themselves reported their subjective observations.

The sole problem experienced was related to the mode of administration and the available dosage during the time when the compound was available only in the 250 mg. capsules. The capsule was rather large and the compound, when removed from the capsule, proved rather bitter. This sometimes gave rise to difficulties in administering optimal dosages, especially with younger children. Sometimes coating the capsule with butter made swal-

lowing easier. Removing the compound from the capsule and masking the taste in syrups and juices was tried. The best results were obtained by putting the compound in a multiple vitamin syrup. In a few cases the compound as it came in the capsule could not be administered. Later the form of the medicament was changed to a 350 mg. sugar-coated tablet and no difficulties were reported in its use.

The only side-effect noted was drowsiness in some of the younger children. It is believed this could be easily relieved with better control of dosage. No changes in blood count or urine attributable to the medication were observed. Nor was any drug intolerance reported or observed.

In no case was it reported that the drug had any ill effect. In only two cases where an adequate regimen was administered was the medication reported to have no effect. In two ataxic patients the drug appeared too relaxing and acted to make them extremely sleepy and puttylike. Use was discontinued after about three weeks and it was not tried with other ataxic patients.

The remaining patients all experienced increased muscle relaxation and an improved psychological state far exceeding that previously obtained with such drugs as chlorpromazine, diphenylhydantoin, trihexyphenidyl, phenobarbital and meprobamate. The children were happier, friendlier and more helpful so there was a decreasing need of tying them in their chairs. There was an increased ease of attaining relaxation in treatment and it became possible to stretch and manipulate heretofore rigid limbs because of the relaxant effects of Soma. Frequently the patient was able to reassert control of them.

Physical therapy made marked gains; in one case up to 15 degrees additional ankle flexion was possible and was accepted without complaint though previously it had been the source of major complaint and had provoked crying and whining. Decreased tension was noted in feeding, toileting and dressing. Walking improved and there was more willingness to try to walk. Similarly, the children lost their apathy and took an increased interest in the world around them. With the drug they became less fearful and more comfortable in strange places and new situations. Because of better muscular control and increased responsiveness their verbal abilities often increased.

One group of the patients themselves reported less fear of falling from chairs, longer tolerance of locked braces in standing, a feeling of being relaxed.

In almost every case the medication facilitated the bracing process and greater ease was noted in locking the braces. The braces could be kept on for much longer periods, since the muscles were more relaxed and hence easier to brace and the children were happier and more disposed to put up with the discomfort involved. The parents of these children were also aided, as they frequently resented the burden of care and had felt in some way responsible for the child's disability, so they attempted to atone for this guilt-feeling by becoming extremely solicitous and found it difficult to force the discomfort and pain of braces on the child. (Few can steel themselves to keep braces locked in place forcibly, in the face of a child's screaming, for the long periods necessary to straighten the limbs.)

On re-examination of the patients by the physician, the following changes were noted; a decrease in deformities (probably the result of greater tolerance of corrective braces); faster ability in attaining relaxation and greater length of time in maintaining relaxation.

In patients with rigidity, this drug improved sitting balance and dramatically disrupted the extensor thrust (a state of extreme muscle tension in which the head is thrown back, the back is arched, and sitting is impossible unless the patient is forced into flexion and thereby held in a sitting position). This result was most striking in view of the long period (sometimes up to two years) frequently required to disrupt extensor thrust by other therapies.

Feeding the cerebral-palsied child is frequently a long drawn-out ordeal because of the reversed tongue movement that often accompanies the disease. Many parents reported that with Soma, feeding was easier, quicker, and more enjoyable for both parent and child.

The amount of drooling was greatly reduced. Though the excessive drooling characteristic of many patients with cerebral palsy may seem harmless, it is not harmless psychologically. It is an unpleasant, constant irritation to the parent who must try to keep the child dry, and to the child who knows he presents an unappealing picture to others but cannot control his saliva. It is painful to the parent and damaging to the child's already-severely damaged picture of himself to realize that outsiders take drooling to be a sign of stupidity. Since this drug reduced the amount of drooling, it therefore considerably decreased the psychological burden in many cases. Improved bowel and bladder control was

also often reported and had a similarly important psychological effect.

The simple fact that a heretofore fretful, whining, crying, messy child was more relaxed, happier and cleaner made him less a source of irritation and had a marked effect for the better on both the child and the family.

On the basis of these results, this muscle relaxant seems to offer great promise for shortening the long-term treatment necessary in cerebral palsy. If further research substantiates these findings, it seems likely that its prompt use as soon as diagnosis is made will lessen the time of treatment necessary to make the cerebral-palsied child sit up and walk. Such quick progress, with concomitant relaxation and improved psychological state, can be expected to have at least three major effects: It will speed up physical habilitation; it will lead to greater hope on the part of the parents and make them more accepting toward the child; and, very important in chronic illness, it will prevent the child from becoming accustomed to helplessness and attention and will encourage his willingness to bear the pain necessary to get better.

PRELIMINARY TRIAL OF A NEW MUSCLE RELAXANT
N-isopropyl-2-methyl-2-propyl-1, 3-propanediol dicarbamate
(SOMA)
IN OUTPATIENT CHILDREN WITH CEREBRAL PALSY

Description	*No.*	*Ill Effect*	*Not Improved*	*Improved*	*% Who Improved*
Athetoids	34	0	2	32	94
Ataxics	2	0	2	—	—
Spastics	27	0	—	27	100
Rigidities	11	0	—	11	100
Tremor	1	0	—	1	—
Unknown Degenerative Disease of Nervous System	2	0	—	2	—
Totals	77	0	4	73	

Patients included 46 males and 31 females, ranging in age from 13 months to 25 years.

SUMMARY

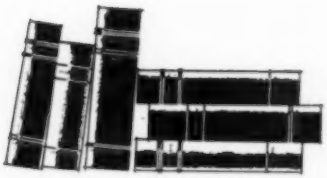
In a preliminary exploratory study, N-isopropyl-2-methyl-2-propyl-1, 3-propanediol dicarbamate, a new muscle relaxant (Soma), received its first outpatient clinical trials for cerebral palsy in 77 young patients. There were no untoward reactions and no effects on blood or urine. With the exception of two ataxic

patients who became so completely relaxed that continued use of the drug in that disorder was thought unwise, and of two other patients who failed to react, results showed great promise. Striking muscle relaxation and improvement in general emotional state were obtained. A decrease in deformation, probably the result of greater tolerance of corrective braces, was noted. Most dramatic was the prompt disruption of extensor thrust and the ability to tolerate locked braces for much longer periods of time, which led quickly to marked gains in physical ability. Secondary gains included less drooling, easier feeding, and increased bowel and bladder control.

While this preliminary study did not have the scientific controls necessary for a thorough evaluation of the new compound, the very promising results were thought to justify early publication in the hope that they would stimulate other investigators. A more extensive study is presently under way to determine whether further experience will confirm the early findings that Soma is able to shorten the period of suffering of cerebral-palsied patients and of their families.

Catherine E. Spears, M.D., 25 Red Road, Chatham, N. J.
Winthrop Morgan Phelps, M.D., 3038 St. Paul St., Baltimore, Md.

Note: Following presentation in the June issue of Dr. Phelps' "Preliminary Institutional Evaluation", *Archives* is pleased to publish this second Study by Doctors Spears and Phelps.



. . . Books

Edited by
MICHAEL A. BRESCIA, M.D.

THE CEREBRAL-PALSIED CHILD: A guide for parents. By Winthrop M. Phelps, M.D., Thomas W. Hopkins, Ph. D. and Robert Cousins. Foreword by Frances R. Horwich, Ph. D.; Introduction by Dean W. Roberts, M.D., Director, National Society for Crippled Children and Adults, Inc. Cloth. Pp. 237. Price $3.95. Simon and Schuster, New York. 1958.

The varied backgrounds of the three authors of this book bring together in one volume, a coordinated medico-educational discussion of the problems which a parent encounters when he learns his child is a victim of cerebral palsy and is faced with what to do about it and how to plan for the future. The fact that the term cerebral palsy encompasses such a variety of symptoms according to the part of the brain involved and such a wide range of disability according to the extent of the damage, makes the diagnosis a very confusing one to parents. They are likely to identify their child's condition with that of some other cerebral palsied child whom they have known and to conclude erroneously that their child's problems and future are similar. This book discusses all possible ways in which a child may be affected.

Dr. Phelps, the senior author, has devoted a lifetime as a physician to the study of children with this condition. He is an acknowledged, most eminent authority on the subject. His explanations and discussions will surely save doctors time and patience in answering the multitude of questions which beset parents and which they have the right to ask. It should prevent parents from distrusting diagnosis or advice because it differs from what they have heard in relation to other children so afflicted.

Dr. Hopkins, the second author, is an educator who, as Principal of a school for the cerebral palsied, has actually coped with the challenging problem of educating these variously handicapped children. He discusses what parents can do at home and how they can find the professional help nearest them for consultation, therapy and education.

The third author, an editor and writer, has contributed his professional skill as well as his personal knowledge as the father

of a cerebral palsied child, about what it is that troubles the parent and sometimes blinds them to important needs of their children, such as achieving self-help and independence to the limits of their ability.

The book is thus highly recommended to pediatrists and all others who may be involved with the cerebral palsied child. Doctors themselves may even learn considerable by spot-reading it. Surely, the directory in the appendix of Associations, Agencies and Schools dealing especially with cerebral palsy, is sufficient reason for keeping the book on the doctor's reference-shelf.

HELEN THOMPSON, PH. D.

THE FAMILY MEDICAL ENCYCLOPEDIA: By Justus J. Schifferes, Ph. D., pages 617, cloth, Little, Brown and Co., Boston, Mass., 1959, Price $4.95.

Every family needs a simple, comprehensive guide to health and medical care. The Family Medical Encyclopedia is the first book to really meet this need. The purpose of this book is to provide easily understood, common-sense information whose mastery will render medical and life emergencies less likely to happen. The book aims to create attitudes toward health and disease which will lead toward healthier living. The psychological as well as the physical aspects of health are considered. Approximately 2,500 medical topics of general interest and importance are described or defined herein. Taken altogether, they provide a brief but comprehensive summary of modern medicine, at the level at which the average person is interested.

The Encyclopedia is an ABC of up-to-date medical and scientific knowledge, set down in simple, non-technical language. Every effort has been made to keep it realistic and practical by avoiding theory and dealing with questions that are commonly asked. The text is actually three books in one: an authoritative health encyclopedia, an illustrated medical dictionary and an indispensable manual of first aid. It also answers your most common and pressing questions about hospitals, modern medicine, health and disease. The book is written in words which are easy to understand. The subjects are arranged from A to Z as in a dictionary, and they include lucid definitions of those medical terms most frequently used by physicians and nurses. Resort to this book should often replace doubt, uneasiness, and ignorance about a medical subject with certainty, satisfaction and knowledge.

The Family Medical Encyclopedia is a book to be kept close at hand for quick reference, leads to greater knowledge of medicine today and is a complete guide to health and medical care for the entire family. Such a book should be in the library of every home today.

JOSEPH M. COVELLI, M.D.

THE GIFTED GROUP AT MIDLIFE: Thirty-five years' follow-up of the superior child. Volume V, Genetic Studies of Genius. By Lewis M. Terman and Melita H. Oden. Cloth. Pp. 187. Price $4.50. Stanford University Press, Stanford, California and Oxford University Press, London. 1959.

In 1921, after Professor Terman had developed his famous revision of the Binet-Simon Intelligence Test, he used this test to locate and study the top intellectually superior one percent of the children in the schools of California. Over one thousand children were discovered with IQ's ranging 135 upward with 77 at 170 IQ or higher. The group had a mean IQ of about 150. An additional similar group in the high schools were located by other tests. This brought the total group to about fifteen hundred intellectually gifted children. These children have been repeatedly studied. The present volume is the fifth report and brings the story of their lives up to date. Six and .9 percent have died. Of the group still living, ninety-five percent actively participated in the present study. Information was indirectly secured for another one-half percent.

The report covers health, general adjustment, present intellectual status, education, careers, avocational activities and interests, marital life, spouses and offspring. It is a fascinating report—reassuring in that on the whole these persons have maintained a position of relative general superiority but reassuring too that a few have chosen relatively menial positions as a satisfying way of life. The differences between the male and female roles are considered throughout. It was of interest to know, for instance, that about fifty percent of the women were housewives and a little over forty percent were employed full-time.

The study is devoted largely to an analysis of the group as a whole with occasional references to individuals. It is a unique study and an important one. In addition it is a living tribute to its originator. The data will furnish source material for many future students.

The gifted child have often worried and baffled parents. This book will not only interest them but reassure them. Furthermore, it is not too technical for parents to read.

HELEN THOMPSON, PH. D.

A HANDBOOK ON DISEASES OF CHILDREN: By Bruce Williamson, M.D., F.R.C.P., Eighth Edition, pages 464, cloth, The Williams and Wilkins Co., Baltimore, Maryland, 1957, Price $6.00.

This handbook is primarily a brief in pediatrics written by a British author for medical students and general practitioners. The book is clear, concise and comprehensive. Revisions of sections in the text have been made in order to keep up with the progress of medicine. There are 117 illustrations in 30 chapters.

The contents of the book comprise the usual standard text. The introduction is a statistical review for England and Wales including morbidity and mortality rates and then proceeds to a discussion on diseases of the respiratory system followed by disorders of the heart and circulation, the alimentary system, endocrine glands, nutrition and metabolism, diseases of the blood and lymphatic system, vasomotor and trophic disorders, genitourinary system, diseases of bones and joints, muscles, skin diseases, diseases of the eye, organic and functional diseases of the nervous system, arthritis, tuberculosis, and the common fevers of childhood. The last two chapters comprise infant welfare and dietetics, artificial feeding and a formulary.

This handbook with its current and extensive pediatric information will be especially useful to the family doctor who so frequently encounters a wide variety of children's ailments in his day to day practice. Diseases of Children should be a part and requisite of every medical student's, general practitioner's and pediatrician's library. JOSEPH M. COVELLI, M.D.

FAMILY GUIDE TO TEENAGE HEALTH: By Edward T. Wilkes, M.D., Associate Clinical Professor of Pediatrics, New York University Medical College, and Associate Attending Pediatrist, The University Hospital. Cloth. Pp. 244. Price $4.00. The Ronald Press Company, New York.

The teen years may be the healthiest but they nevertheless have their health problems. It is the age when the childhood doctor is sometimes outgrown and no other close physician relationship has been formed—they have no one to whom they can blurt out the problems which worry them. Dr. Wilkes, a seasoned pediatrist as

well as a father writes understandingly and knowingly. His language is simple and direct. Furthermore he does not neglect the psychological implications which these problems have for the young boy or girl approaching adulthood. He discusses individual growth differences which particularly concern the teenagers such as sexual development; he discusses the short, the tall, the obese, the thin and underweight and what can and cannot be done about it. He also discusses such problems as smoking, drinking, drug addiction, acne, nocturnal emissions and menstrual hygiene. Sex expression with its problems both normal and abnormal are treated with conciseness and clarity. The emphasis is upon health and normality.

The title, "Family Guide" is apt because it is a book that could be read with profit by both parents and their adolescent children. It could even furnish a basis for frank discussion between the two generations, at times seemingly separated by impenetrable walls. Doctors too should have a copy at their elbow—or in their waiting room!

HELEN THOMPSON, PH. D.

AIDS TO THE DIAGNOSIS AND TREATMENT OF DISEASE OF CHILDREN: By F. M. B. Allen, M.D., F.R.C.P. (London) Tenth Edition, pages 294, cloth, The Williams and Wilkins Co., Baltimore, Maryland, 1957, Price $3.00.

The material in this book is primarily a synopsis of pediatrics written by a British author for medical students and general practitioners. Actually, the book is a small volume on the illnesses of infants and children revised to include newer views and advances in the diagnosis and treatment in pediatrics.

The contents of the book are divided into 18 chapters. The text is standard, comprehensive and brief. The accounts of diseases are more or less in outline form. For the first time in this revised edition, the author includes such conditions as galactosemia, endocardial fibroelastosis and reticuloendotheliosis.

In the first ten chapters, the author discusses the newborn infant, infant feeding, the premature infant, vitamins and vitamin deficiency, diseases of the alimentary tract, respiratory tract, the infectious fevers, tuberculosis, rheumatic disorders and diseases of the circulatory system. The following seven chapters consist of genito-urinary diseases, endocrine diseases, metabolism, diseases of the nervous system, muscles, blood and skin diseases including syphilis in childhood. The last chapter is an appendix which is divided into four sections—1. Diets for children, 2. Useful tables, 3. Chemotherapy, 4. Prescriptions.

JOSEPH M. COVELLI, M.D.

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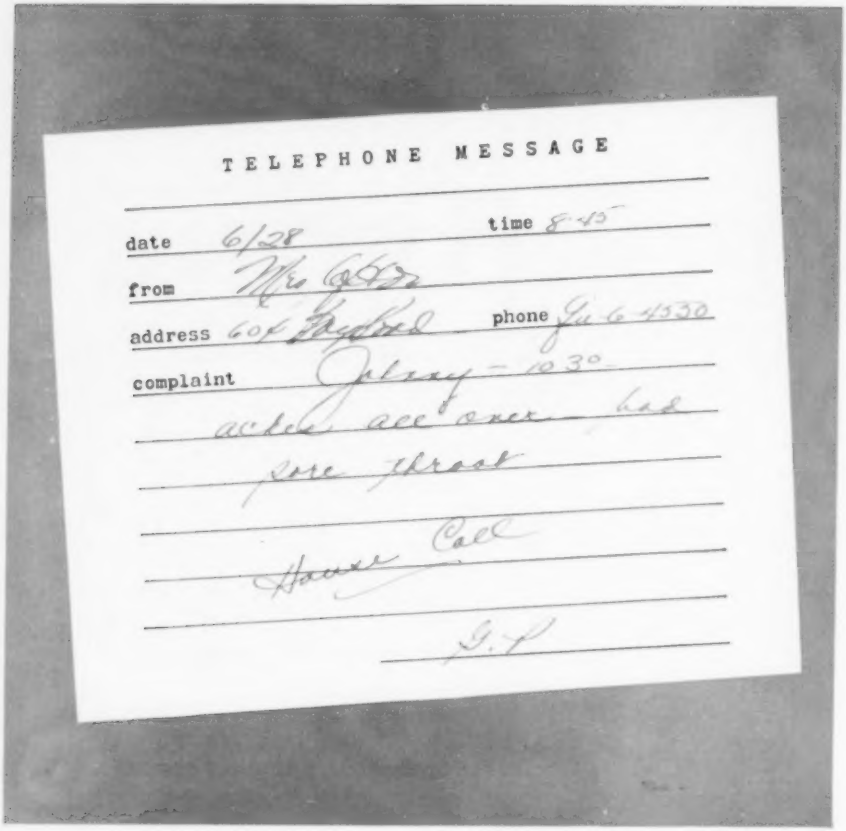

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